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一、單選題 (每題 3%)

- Which one of the following statements is false?
 - A takeover is not an effective way to replace existing managers.
 - The mixture of debt and equity is called capital structure.
 - Agency problems occur when there is a conflict between managers and stockholders.
 - The Sarbanes-Oxley Act increases a firm's listing cost.
 - The action that shareholders act to replace current managers is called a proxy fight.
- Which of the following would be treated as a cash inflow?
 - A decrease in accounts receivable.
 - A decrease in notes payable.
 - A decrease in accounts payable.
 - A and C.
 - None of the above.
- Uranus Corp. is considering whether to pursue a restricted or relaxed current asset investment policy. The firm's annual sales are \$400,000; its fixed assets are \$100,000; debt and equity are each 50 percent of total assets. EBIT is \$36,000, the interest rate on the firm's debt is 10 percent, and the firm's tax rate is 40 percent. With a restricted policy, current assets will be 15 percent of sales. Under a relaxed policy, current assets will be 25 percent of sales. What is the difference in the projected ROEs between the restricted and relaxed policies?
 - 0%.
 - 6.2%.
 - 5.4%.
 - 1.6%.
 - 3.8%.
- Which of the following would cause the investment to look better in project evaluations?
 - The discount rate decreases.
 - The total cash flows remain the same, but cash flows are extended over a longer period of time.
 - The inflation increases.
 - The uncertainty of the project's cash flows increases.
 - With total cash flows fixed, more cash flows are received in later years and less received in earlier years.
- You want to restrict your exposure in both interest rate risk and default risk. Which one of the following bonds best satisfies your criteria?
 - BBB bond with 10 years to maturity
 - BBB bond with 5 year to maturity
 - AAA bond with 5 year to maturity
 - AAA bond with 10 year to maturity
 - AAA perpetual bond

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6. Common stock can be valued using the perpetuity valuation formula if
- the growth rate is higher than the discount rate.
 - dividends are not expected to grow.
 - the growth rate in dividends is not constant.
 - investors do not intend to sell the stock.
 - firms paying all earnings as dividends.
7. Which one of the following statements about investing a project is correct?
- A positive NPV signals a rejection decision.
 - Projects should be accepted when the PI (profitability index) is positive.
 - A payback period that is greater than the required period signals an acceptance decision.
 - When the IRR exceeds the required return, a project should be rejected.
 - When the NPV is positive, the PI will indicate acceptance.
8. If the stock market is semistrong-form efficient, which of the following statements would be correct?
- Since the market is efficient, investors cannot enjoy any return at all by investing in securities.
 - The required returns on stocks equal the required returns on bonds.
 - A trading strategy in which you buy stocks that have recently fallen in price is likely to provide you with a return that exceeds the return on the overall stock market.
 - If you have insider information about a particular stock, you cannot expect to earn an above average return on this information because it is already incorporated into the current stock price.
 - Even if a market is semistrong-form efficient, an investor could still earn a better return than the market return if he or she had inside information.
9. Which one of the following risk measures will be priced for investors to shape the expected return of a security?
- Unique risk.
 - Market risk premium.
 - Beta.
 - Standard deviation.
 - All of the above.
10. The trade-off theory of capital structure suggests that
- firms add leverage whenever interest rates are low.
 - firms should use less debt if they are more likely to have financial distress.
 - firms should use 50% debt and 50% equity.
 - firms should use debt to overcome high par values of stock.
 - firms prefer to issue equity to take advantage of stock overvaluation.
11. The optimal capital structure has been achieved when the
- bankruptcy cost is lowest.
 - weight of equity is equal to the weight of debt.
 - cost of equity is maximized given a pre-tax cost of debt.
 - debt-equity ratio is such that the cost of debt exceeds the cost of equity.
 - debt-equity ratio selected results in the lowest possible weighed average cost of capital.

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12. Which one of the following theories can explain the positive stock return when firms announce dividend increases?

- A. Pecking order theory
- B. Dividend irrelevance theory
- C. Tax preference theory
- D. Agency cost theory
- E. Information content theory

二、計算及申論題

- You want to buy a car and need to choose between the low finance rate and the cash discount. In the first option, you can enjoy the 3% APR financing for 48 months. In the second option, you face a 7.2% APR loan for 48 months but can get a cash reward of \$15,000 for the down payment. If the car is worth \$250,000, which option you will choose? Please find the difference in the monthly payment between the two choices. (15%)
- Sunny Inc. has a debt-to-equity ratio of 3, weighted average cost of capital of 14.75%, cost of debt of 10%, and tax rate of 35%. What is the weighted average cost of capital if Sunny's debt-to-equity becomes 1? (15%)
- In January 2013, HTQ Corp. is searching for its appropriate discount rate to evaluate a new project. The balance sheet information at the end of year 2012 is as follows (all numbers are in millions). HTQ has 500,000 annual-coupon bonds, each with the \$1,000 face value and maturity date of January 2014. The annual coupon rate is 4.37%. Currently, each HTQ bond sells for \$980. HTQ has 1 million preferred shares outstanding with a book value of \$100 per share. The preferred stock is currently traded at \$90 per share. The annual preferred dividend is \$7.2 per share. HTQ has 10 million common shares outstanding, and the current market price is \$60 per share. The beta for HTQ common stock was about 0.75 in the past. If the historical market risk premium is 12%, 3-month T-bill rate is 3%, and HTQ's marginal tax rate is 40%, what is its weighted average cost of capital? (19%)

Assets		Liabilities and Equity	
Working capital	300	Corporate debt	500
Plant and equipment	460	Preferred stock	100
Other assets	240	Common stock	400
Total	1,000	Total	1,000

- The following table reports leverage ratios for different industries. What are the important factors to account for the large variation in leverage across different industries? Limit your answer within 30 words. (15%)

Industries	Debt-to-asset ratio
Utility	49.4%
Hotels and Lodging	44.2%
Department Stores	38.9%
Electronics	7.1%
Drugs and Chemicals	6.8%
Computers	5.3%

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1. (30%) In a very large general education class, 60% are science majors and 40% are liberal arts majors. Twenty percent of the science majors are seniors, while 30% of the liberal arts majors are seniors.

(1) What is the probability that a randomly selected student would be a senior, given that he or she is a liberal arts major. (6%)

(2) If there are 500 students in the class, how many of them are liberal arts majors and seniors? (3%)

(3) Create a hypothetical table of 500 student with major (science, liberal arts) as the row variable and class (senior, non-senior) as the column variable, illustrating the proportions given as above. (7%)

(4) Test to determine whether students' major and class are independent based on the hypothetical table in (3) at the 0.05 level of significance. (7%)

(5) If 500 students are randomly chosen and there are 280 science majors and 320 non-seniors. Please construct and interpret a 95 percent confidence interval estimate for the difference of the population proportions between science majors and non-seniors. (7%)

2. (25%) Researchers speculate that drivers who do not wear a seat-belt are more likely to speed than drivers who do wear one. The following data were collected on a random sample of 20 drivers who were clocked to see how fast they were driving (miles per hour), and then were stopped to see whether they were wearing a seat belt.

Driver	1	2	3	4	5	6	7	8	9	10
Speed	62	60	72	85	68	64	72	72	75	63
Seatbelt	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes
Driver	11	12	13	14	15	16	17	18	19	20
Speed	62	84	76	60	66	63	64	80	52	64
Exercises	No	No	No	Yes	No	No	Yes	Yes	Yes	Yes

(1) Do these results support the claim that the mean speed is higher for the population of drivers who do not wear seat-belts than for the population of drivers who do? Use a t -test at the 0.05 level of significance. (10%)

(2) Use a one-way analysis of variance method to test the same claim for part (1). (10%)

(3) Verify necessary conditions and state any assumptions for carrying out parts (1) and (2). (5%)

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3. (25%) An investor is given the following information about the returns on two stocks.

Stock	A	B
Mean	0.09	0.13
Standard deviation	0.15	0.21

- (1) If he is most interested in maximizing his returns, which stock should he choose? Why? (3%)
- (2) If he is most interested in minimizing his risk, which stock should he choose? Why? (3%)
- (3) Compute the expected value and standard deviation of the portfolio composed of 60% stock A and 40% stock B. The coefficient of correlation between these two stocks is 0.4. (7%)
- (4) Describe what happens to the expected value and standard deviation of the portfolio returns when the coefficient of correlation changes. (6%)
- (5) Assume that the returns follow a normal distribution. What is the probability of getting the returns more than 0.13 when choosing stock A? (6%)

4. (20%) Consider the regression model

$$y_i = \beta x_i + \epsilon_i, \quad i = 1, 2, \dots, n,$$

where the random errors ϵ_i 's are independent and follow a normal distribution with zero mean and constant variance σ^2 .

- (1) Show the least squares estimate of β , denoted by $\hat{\beta}$. (7%)
- (2) Show that $\hat{\beta}$ is unbiased. (5%)
- (3) Find the variance of $\hat{\beta}$, denoted by $Var(\hat{\beta})$. (8%)

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t-table (right tail)

For each row (degrees of freedom k) and column (right tail probability α), the table entry e satisfies $\Pr(t_k \geq e) = \alpha$. Note that the t -distribution is symmetric about 0.

degrees of freedom	right tail probability				
	0.25	0.10	0.05	0.025	0.01
1	1.000	3.078	6.314	12.706	31.821
2	0.816	1.886	2.920	4.303	6.965
3	0.765	1.638	2.353	3.182	4.541
4	0.741	1.533	2.132	2.776	3.747
5	0.727	1.476	2.015	2.571	3.365
6	0.718	1.440	1.943	2.447	3.143
7	0.711	1.415	1.895	2.365	2.998
8	0.706	1.397	1.860	2.306	2.896
9	0.703	1.383	1.833	2.262	2.821
10	0.700	1.372	1.812	2.228	2.764
11	0.697	1.363	1.796	2.201	2.718
12	0.695	1.356	1.782	2.179	2.681
13	0.694	1.350	1.771	2.160	2.650
14	0.692	1.345	1.761	2.145	2.624
15	0.691	1.341	1.753	2.131	2.602
16	0.690	1.337	1.746	2.120	2.583
17	0.689	1.333	1.740	2.110	2.567
18	0.688	1.330	1.734	2.101	2.552
19	0.688	1.328	1.729	2.093	2.539
20	0.687	1.325	1.725	2.086	2.528
21	0.686	1.323	1.721	2.080	2.518
22	0.686	1.321	1.717	2.074	2.508
23	0.685	1.319	1.714	2.069	2.500
24	0.685	1.318	1.711	2.064	2.492
25	0.684	1.316	1.708	2.060	2.485
26	0.684	1.315	1.706	2.056	2.479
27	0.684	1.314	1.703	2.052	2.473
28	0.683	1.313	1.701	2.048	2.467
29	0.683	1.311	1.699	2.045	2.462
30	0.683	1.310	1.697	2.042	2.457
35	0.682	1.306	1.690	2.030	2.438
40	0.681	1.303	1.684	2.021	2.423
45	0.680	1.301	1.679	2.014	2.412
50	0.679	1.299	1.676	2.009	2.403
gaussian	0.675	1.282	1.646	1.962	2.330

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F - Distribution ($\alpha = 0.05$ in the Right Tail)

df ₂	df ₁	Numerator Degrees of Freedom								
		1	2	3	4	5	6	7	8	9
1		161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54
2		18.513	19.000	19.164	19.247	19.296	19.330	19.353	19.371	19.385
3		10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123
4		7.7086	9.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.0410	6.9988
5		6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725
6		5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.0990
7		5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767
8		5.3177	4.4590	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881
9		5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789
10		4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204
11		4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962
12		4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964
13		4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144
14		4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458
15		4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876
16		4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377
17		4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943
18		4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563
19		4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227
20		4.3512	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928
21		4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.3660
22		4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419
23		4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201
24		4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002
25		4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821
26		4.2252	3.3690	2.9752	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655
27		4.2100	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501
28		4.1960	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.2360
29		4.1830	3.3277	2.9340	2.7014	2.5454	2.4324	2.3463	2.2783	2.2229
30		4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107
40		4.0847	3.2317	2.8387	2.6060	2.4495	2.3359	2.2490	2.1802	2.1240
60		4.0012	3.1504	2.7581	2.5252	2.3683	2.2541	2.1665	2.0970	2.0401
120		3.9201	3.0718	2.6802	2.4472	2.2899	2.1750	2.0868	2.0164	1.9588
∞		3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384	1.8799

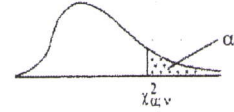
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Table of the Chi-square Distribution



$\alpha =$	0.995	0.99	0.98	0.975	0.95	0.90	0.80	0.20	0.10	0.05	0.025	0.02	0.01	0.005	0.001	$=\alpha$
V = 1	0.0000393	0.000157	0.00028	0.000582	0.00393	0.0158	0.0642	1.642	2.706	3.841	5.024	5.412	6.635	7.879	10.827	V = 1
2	0.0100	0.0201	0.0404	0.0506	0.103	0.211	0.446	3.219	4.605	5.991	7.378	7.824	9.210	10.597	13.815	2
3	0.0717	0.115	0.185	0.216	0.352	0.584	1.005	4.642	6.251	7.815	9.348	9.837	11.345	12.838	16.268	3
4	0.207	0.297	0.429	0.484	0.711	1.064	1.649	5.989	7.779	9.488	11.143	11.668	13.277	14.860	18.465	4
5	0.412	0.554	0.752	0.831	1.145	1.610	2.343	7.289	9.236	11.070	12.832	13.388	15.086	16.750	20.517	5
6	0.676	0.872	1.134	1.237	1.635	2.204	3.070	8.558	10.645	12.592	14.449	15.033	16.812	18.548	22.457	6
7	0.989	1.239	1.564	1.690	2.167	2.833	3.822	9.803	12.017	14.067	16.013	16.622	18.475	20.278	24.322	7
8	1.344	1.646	2.032	2.180	2.733	3.490	4.594	11.030	13.362	15.507	17.535	18.168	20.090	21.955	26.125	8
9	1.735	2.088	2.532	2.700	3.325	4.168	5.380	12.242	14.684	16.919	19.023	19.679	21.666	23.589	27.877	9
10	2.156	2.558	3.059	3.247	3.940	4.865	6.179	13.442	15.987	18.307	20.483	21.161	23.209	25.188	29.588	10
11	2.603	3.053	3.609	3.816	4.575	5.578	6.989	14.631	17.275	19.675	21.920	22.618	24.725	26.757	31.264	11
12	3.074	3.571	4.178	4.404	5.226	6.304	7.807	15.812	18.549	21.026	23.337	24.054	26.217	28.300	32.909	12
13	3.565	4.107	4.765	5.009	5.892	7.042	8.634	16.985	19.812	22.362	24.736	25.472	27.688	29.819	34.528	13
14	4.075	4.660	5.368	5.629	6.571	7.790	9.467	18.151	21.064	23.685	26.119	26.823	29.141	31.319	36.123	14
15	4.601	5.229	5.985	6.262	7.261	8.547	10.307	19.311	22.307	24.996	27.488	28.259	30.578	32.801	37.697	15
16	5.142	5.812	6.614	6.908	7.962	9.312	11.152	20.465	23.542	26.296	28.845	29.633	32.000	34.267	39.252	16
17	5.697	6.408	7.255	7.564	8.672	10.085	12.002	21.615	24.769	27.587	30.191	30.995	33.409	35.718	40.790	17
18	6.265	7.015	7.906	8.231	9.390	10.865	12.857	22.760	25.989	28.869	31.526	32.346	34.805	37.156	42.312	18
19	6.844	7.633	8.367	8.707	10.117	11.651	13.716	23.900	27.204	30.144	32.852	33.687	36.191	38.582	43.820	19
20	7.434	8.260	9.237	9.591	10.851	12.443	14.578	25.038	28.412	31.410	34.170	35.020	37.566	39.997	45.315	20
21	8.034	8.897	9.915	10.283	11.591	13.240	15.445	26.171	29.615	32.671	35.479	36.343	38.932	41.401	46.797	21
22	8.643	9.542	10.600	10.982	12.338	14.041	16.314	27.301	30.813	33.924	36.781	37.659	40.289	42.796	48.268	22
23	9.260	10.196	11.293	11.688	13.091	14.848	17.187	28.429	32.007	35.172	38.076	38.968	41.638	44.181	49.728	23
24	9.886	10.856	11.992	12.401	13.848	15.659	18.062	29.553	33.196	36.415	39.364	40.270	42.980	45.558	51.179	24
25	10.520	11.524	12.697	13.120	14.611	16.473	18.940	30.675	34.382	37.652	40.646	41.566	44.314	46.928	52.620	25
26	11.160	12.198	13.409	13.844	15.379	17.292	19.820	31.795	35.563	38.885	41.923	42.856	45.642	48.290	54.052	26
27	11.808	12.879	14.125	14.573	16.151	18.114	20.703	32.912	36.741	40.113	43.194	44.140	46.963	49.645	55.476	27
28	12.461	13.565	14.847	15.308	16.928	18.939	21.588	34.027	37.916	41.337	44.461	45.419	48.278	50.993	56.893	28
29	13.121	14.256	15.574	16.047	17.708	19.768	22.475	35.139	39.087	42.557	45.722	46.693	49.588	52.336	58.302	29
30	13.787	14.953	16.306	16.791	18.493	20.599	23.364	36.250	40.256	43.773	46.979	47.962	50.892	53.672	59.703	30
40	20.706	22.164	23.838	24.433	26.509	29.051	32.345	47.269	51.805	55.759	59.342	60.436	63.691	66.766	73.402	40
50	27.991	29.707	31.564	32.357	34.764	37.689	41.449	58.164	63.167	67.505	71.420	72.613	76.154	79.490	86.661	50
60	35.535	37.485	39.699	40.482	43.188	46.459	50.641	68.972	74.397	79.082	83.298	84.580	88.379	91.952	99.607	60
70	43.275	45.442	47.893	48.758	51.739	55.329	59.898	79.715	85.527	90.531	95.023	96.388	100.425	104.215	112.317	70
80	51.171	53.539	56.213	57.153	60.391	64.278	69.207	90.405	96.578	101.880	106.629	108.069	112.329	116.321	124.839	80
90	59.196	61.754	64.634	65.646	69.126	73.291	78.558	101.054	107.565	113.145	118.136	119.648	124.116	128.299	137.268	90
100	67.327	70.065	73.142	74.222	77.929	82.358	87.945	111.667	118.498	124.342	129.561	131.142	135.807	140.170	149.449	100

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試題隨卷繳交

考試科目

微積分

所別

財務管理組

考試時間

2月23日(六)第二節

1. (20%) Integral can be valued using numerical methods of integration. In this question, please use different numerical methods to approximate the value of a definite integral. Evaluate the integral $\int_1^2 \frac{1}{x^2} dx$, by dividing the interval $[1, 2]$ into 4 subintervals using

- (a) (5%) Riemann sum;
- (b) (5%) the Trapezoidal rule;
- (c) (5%) the Simpson's rule;
- (d) (5%) the exact value of the definite integral.

Round your answer to four decimal places.

2. (10%) Suppose that f is differentiable on $(1, 4)$, continuous on $[1, 4]$, and $f(1) = 2$. Given that $2 \leq f'(x) \leq 3$ for all x in $(1, 4)$.

- (a) (5%) What is the least value that f can take on at 4?
- (b) (5%) What is the greatest value that f can take on at 4?

3. (20%) Find the following integrals.

- (a) (10%) $\int_1^4 \frac{5\sqrt{x}}{\sqrt{x}} dx$
- (b) (10%) $\int \frac{x-11}{x^2+3x-4} dx$

4. (20%) Please determine the convergence or divergence of the following series:

- (a) (10%) $\sum_{k=1}^{\infty} ke^{-3k^2}$
- (b) (10%) $\sum_{n=1}^{\infty} \frac{n^2}{n!}$

5. (15%) Please solve the following differential equation.

$$x \frac{dy}{dx} + 2y = 1 - \frac{1}{x}, x > 0.$$

6. (15%) Please evaluate the integral $\int_0^1 \int_y^1 x^2 e^{xy} dx dy$.

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註 試題隨卷繳交